

Delirium and its Implications for Critical Care Nursing

An Honors Thesis (HONRS 499)

by

Carla Myerly

Thesis Advisor

Dr. Debra Siela

Ball State University

Muncie, Indiana

July 2012

Expected Date of Graduation

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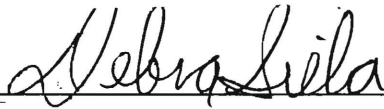
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A handwritten signature in black ink, reading "Debra Siela", is written over a horizontal line.

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Abstract

Delirium is one of the most common and detrimental mental health complications of critical care, yet it goes grossly undiagnosed. By gaining a better grasp on the pathophysiologic processes of this condition, we can better understand both how to treat and prevent delirium. Nurses play a pivotal role in detecting the early signs and symptoms because of their constant presence at the bedside. Therefore, it is important to promote educational programs on critical care units to better equip nurses in preventing further complications possible from delirium. Because of the stressful nature of the course of this condition, it is also important to assess the family and caregivers for the emergence of anxiety and caregiver role strain.

Acknowledgements

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Introduction

Delirium is an acute, confused state that is indicative of a decline in health²³. The Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV), defines delirium as a disturbance of consciousness with inattention accompanied by a change in cognition or perceptual disturbance that develops in a short period (hours to days) and fluctuates over time. This definition highlights the four characteristics of delirium which include: altered level of consciousness, inattention, disorganized thinking, and acute onset with a fluctuating course⁶.

The prevalence of delirium on hospital admission has been reported to be between 14% and 24%¹, and the incidence of developing delirium during hospitalization has been reported to be between 6% and 56%¹. Critically ill patients are prone to the development of delirium during their stay in the intensive care unit (ICU)⁶, and this is the most common mental health issue found in the critical care setting. It affects nearly 80% of critical care patients, 60% of whom were previously comatose or on mechanical ventilation¹². Contrary to popular belief, this condition does not discriminate based on age. Delirium has been reported to develop in 61% of ICU patients less than 65 years of age⁶.

Recently, delirium was reported to be one of the six leading causes of preventable conditions in hospitalized patients older than 65 years of age¹². The importance of recognizing delirium early is highlighted in Kiely and colleagues' (2006) finding that if delirium resolves slowly (or not at all) there is a less than 50% return to pre-illness functioning¹². Delirium has been indicated as a predictor of increased mortality rates, increased length of stay, increased rates of failed extubation and reintubation, increased time on mechanical ventilation, increased hospital costs of up to 40%, increased long-term cognitive impairment resulting in dementia in the elderly, and increased necessity of discharge to a long-term care facility¹².

Types of Delirium

Delirium may present as either hypoactive, hyperactive, or a mixture of both.

Hyperactive delirium, although the most easily detected and diagnosed, is in fact not the most common. Hyperactive delirium is seen in 5% to 22% of patients diagnosed with delirium, whereas hypoactive and mixed make up the majority of ICU patients diagnosed with delirium¹². Hyperactive delirium exhibits overt manifestations such as agitation and restlessness¹². These patients are likely to be combative and uncooperative. They may experience visual and tactile hallucinations. Because of the acute onset of confusion, these patients will pull at tubes, catheters, and intravenous lines¹².

Hypoactive delirium, in contrast, is much more frequently undiagnosed. These patients do not act out as do patients with hyperactive delirium, but rather may seem calm or peaceful. For example, a patient waking from sedation following a surgical procedure or mechanical ventilation may seem to be calm oriented well, but may in fact be experiencing hypoactive delirium⁸. Closer examination of these patients may reveal the characteristic inattention and lack of environmental awareness attributed to hypoactive delirium. These patients may also present with apathy and lethargy, a flat affect, decreased responsiveness and movement, and/or withdrawal¹². Often they will nap continuously during the day and do not ask for any assistance; therefore, hypoactive delirium may be misdiagnosed as depression.

Delirium is of mixed type when the patient fluctuates between hyperactive and hypoactive characteristics, exhibiting manifestations of either both concurrently or characteristics of one type followed by characteristics of the other. The patient may be calm at one point during

the shift and agitated and restless a short time later. Additionally, some patients may have delirium features without manifesting the complete syndrome of delirium¹².

Pathophysiology

The pathophysiology of ICU delirium is not completely understood at this time. It is thought to be multifactorial, and many theories have been formulated including a local inflammatory response of the brain to insult (i.e. infection), resulting in alterations in neuronal activity; imbalances in neurotransmitters (i.e., dopamine, acetylcholine, g-aminobutyric acid, and/or serotonin), with a relative excess of dopamine in relation to acetylcholine; reduced cerebral perfusion; and metabolic derangements⁶. Currently, the most commonly accepted theory is a neurotransmitter abnormality with cholinergic deficiency¹⁴ that affects multiple spheres of the central nervous system, although an undetected diffuse brain injury has also been frequently indicated¹².

Acetyl CoA is a molecule that is produced by glucose breakdown during the citric acid cycle. Hypoglycemia, severe malnutrition, and niacin and thiamine deficiency (resulting in decreased glucose production) may therefore lead to cholinergic deficits¹². Impaired synaptic mechanisms are resultant of nicotine and muscarinic receptor inhibition related to anesthetic agents, anticholinergic medications (commonly used to treat COPD²²), and anticholinergic toxins⁶.

Acetylcholine (produced from the interaction of choline with acetyl CoA) is a neurotransmitter that affects attention and consciousness by acting as a modulator in sensory and cognitive input¹². A dysfunction in the acetylcholine pathway, therefore, will diminish its excitatory effect, and may result in hypoactive delirium¹². Alternatively, dopamine and

norepinephrine act to alter inhibitory effects in the central nervous system¹². Dysfunction resulting in excesses amounts of these neurotransmitters can result in hyperactive delirium.

Because there is insufficient evidence to refute the cholinergic deficiency theory, current research about the pathophysiologic mechanisms of delirium focuses on gaining a better understanding of how delirium relates to other factors such as hypoxia (inadequacy of oxygen reaching the body's tissues), inflammation, chronic stress, and decreased cerebral metabolism¹⁴. This phenomenon may be influenced by the administration of drugs with potent central anticholinergic effects, such as tricyclic antidepressants (indicated for depression, ADHD, and chronic pain) and antihistamines. Volatile anesthetics such as sevoflurane (used as a general anesthetic for surgical procedures²²) and intravenous anesthetics such as propofol (used for sedation of mechanically ventilated patients in the critical care setting²³) also have anticholinergic effects¹². Therefore, critical care patients are especially prone to developing dementia based on the knowledge that the majority of these patients are either postoperative, on mechanical ventilation, or a combination of the two.

If delirium were due solely to acute medication effects, however, the delirium would most likely resolve after the exposure has ended. However, a significant percentage of individuals who develop delirium in the critical care setting continue to have symptoms post discharge and are more likely to develop dementia than patients without delirium. This likelihood raises the possibility of an occult diffuse brain injury resulting from local hypoxia with inadequate perfusion, characteristic of brain organ dysfunction¹².

Risk factors for delirium include what are known as predisposing factors and precipitating factors. Predisposing factors are baseline traits or conditions that increase a person's risk of developing delirium¹⁵. Precipitating factors are acute conditions that act as triggers to the development of delirium¹⁵. Drugs can be considered both predisposing and precipitating factors. The most significant predisposing factor for older adults to develop delirium is dementia, followed by advancing age, neuroleptic drugs, functional impairment, and impaired vision¹⁶. **Table 1**²³ illustrates a full list of risk factors.

Table 1

Potential Risk Factors for Delirium in Critical Care Patients	
Metabolic <ul style="list-style-type: none"> • Acid-base disturbance • Electrolyte imbalance Endocrine <ul style="list-style-type: none"> • Hyperthyroidism or hypothyroidism • Addison's disease • Hyperparathyroidism • Hypoglycemia Intracranial <ul style="list-style-type: none"> • Epidural or subdural hematoma • Intracranial hemorrhage • Meningitis • Encephalitis • Cerebral abscess • Tumor 	Drug-Related <ul style="list-style-type: none"> • Alcohol withdrawal • Drug-induced delirium • Heavy metal poisoning Respiratory <ul style="list-style-type: none"> • Hypoxemia • Hypercarbia Organ Failure <ul style="list-style-type: none"> • Liver encephalopathy • Uremic encephalopathy • Septic shock

Assessment/ Diagnosis

Assessment for delirium should occur both upon admission and throughout the patient's stay in the health care facility. Because older patients are particularly prone to development of delirium, an initial baseline assessment should be established upon admission. In addition to the usual data collected during admission based on the admitting diagnosis and condition, baseline

data should show attention to factors that may indicate the potential for development of delirium including: the presence of dementia or depression, or a history of delirium or confusion, particularly during hospitalization, medication history, especially for identification of polypharmacy or the administration of psychotropic medications, the patient's level of orientation upon admission and any acute changes in orientation or mental status prior to admission, and the presence of any risk factors for delirium¹².

Oftentimes, an assessment for the presence of or potential of developing delirium is one that is overlooked, and frequently goes unperformed. Health care professionals may have difficulty identifying delirium because of their lack of knowledge related to the condition as well as the complex symptoms that appear differently in the presence of other complicating comorbid conditions such as dementia, depression, and the effects of medications²¹. One of the hallmarks of delirium is an acute change in mental status that fluctuates over time, making it difficult to recognize in an environment where lengths of stay are becoming ever shorter. Also, if nurse-patient interactions are brief, it may be difficult to document baseline mental status. Changes in mental status may not be readily assessed or noticed, but these are often the first sign of acute illness in older adults⁵.

The diagnosis of intensive care delirium has been dominated by the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) **Figure 1** and the Intensive Care Delirium Screening Checklist (ICDSC) **Figure 2**. These tools were modified from the DSM-IV-TR definition. The CAM-ICU focuses on four features: acute onset or fluctuating course, inattention, altered level of consciousness, and disorganized thinking. The ICDSC includes inattention, disorientation, hallucination, psychomotor agitation, inappropriate speech or mood, sleep/wake cycle disturbance, and symptom fluctuation. Although the CAM-ICU is a single

time-point assessment, in contrast with the longitudinal observation by the ICDSC, they seem to perform with comparable results at the bedside¹².

If time or circumstances do not allow for a formal screening, nurses should assess the patient's attention simply by asking him or her to name the days of the week backward. If the patient completes this successfully, the nurse should ask for the months of the year backward. If the patient is too lethargic to attend to the task or responds inappropriately and no other obvious cause is present, delirium should be considered and reported to the team immediately. A change in mental status identified and addressed early can often identify an acute problem before it becomes more serious or life threatening²⁰.

Treatment and Prevention

Successful management of hospital-acquired delirium is best accomplished using a combination of prevention techniques and early treatment with the onset of symptoms because delayed treatment has been found to increase mortality in ICU patients with delirium¹².

Proper prevention lies in the recognition of the risk factors present in the patient, awareness of potentially life-threatening and non-immediately life-threatening sources of physical and psychological distress that can be present in a patient, and early detection of the onset of signs and symptoms¹². A solid grasp of these three aspects of delirium—predisposing factors, precipitating factors, and screening, respectively— will allow for successful interventions and quality improvements, particularly because practice gaps have been found in those three areas⁶. This practice can result in improved patient quality of life, decreased length of stay, and lower long-term costs for the patient¹².

Educational strategies such as presenting the delirium assessment results during bedside rounds⁹ should be considered. Educational programs should be aimed at increasing knowledge, making staff members more comfortable with using the chosen assessment method, and acceptance the results of the delirium assessment⁹. Any strategies selected should include the nursing staff as well as the house staff. These strategies may include placing posters in highly trafficked areas on nursing unit, implementation of a kick-off event, medical and nursing grand rounds, broadcast e-mail, and engagement of unit champions.

Current pharmacological treatments are aimed at symptomatic treatment of delirium, and haloperidol is currently the drug of choice^{6,12}. Patients with contraindications to the use of haloperidol (such as Parkinson disease, prolonged QT syndrome, or a history of seizures) may be treated with other psychotropic medications, such as atypical antipsychotics, but should be monitored for adverse effects, such as tardive dyskinesia⁶. Benzodiazepines should be avoided unless absolutely necessary, because they are associated with an increased occurrence of delirium². Adequate pain control must be achieved while taking into account the pathologic process of the source of pain as well as the patient's experience of pain. Neuroleptic agents are reserved primarily for agitated mechanically ventilated patients in whom adequate ventilation cannot be achieved despite deep sedation². There is limited evidence for the benefits of using pharmacologic interventions for delirium in terminally ill patients, although haloperidol is the drug of choice in this situation¹².

Nonpharmacologic treatments have also been recommended. Reorientation and validation therapy (in which delirious thoughts are redirected), massage therapy and music therapy³ have all been used with some success in the symptomatic treatment of delirium.

The ABCDE bundled strategy is recommended as a way to lessen the impact of sedation, mechanical ventilation, and delirium by using a standardized approach that incorporates interdisciplinary collaboration³. This strategy consists of awakening (A), breathing (B) coordination (C), delirium monitoring (D), and exercise/early mobility (E) in the treatment and prevention of acute confusion. Studies have confirmed the effectiveness of this strategy in reducing the impact of delirium. For example, a recent randomized controlled trial found that early physical therapy reduces the duration of delirium in ICU patients¹².

Family Caregivers

Dysfunctional cognition in the delirious patient hinders communication with both the family and health care personnel. The result of this is inhibited symptom assessment, counseling, and active patient participation in the decision-making process. Agitation presented by the patient may be misinterpreted as a presentation of increased pain expression¹⁸. Consequently, conflict may arise among the patient, family, and staff concerning the level of analgesia needed. Family education should be implemented to avoid complications such as the family advocating for inappropriate escalation of opioid dosing. Family education will also increase detection rates and improve care-giver self-confidence which may in turn reduce caregiver role-strain¹⁰.

Family involvement can be beneficial in providing care for the delirious patient. Because of impaired communication with the patient, the family plays a vital role in providing information about the patient to the health care staff. Family presence has been shown to provide an emotionally stabilizing effect in the critical care patient. Family also plays an important role in advocating for the patient and partaking in patient care in regards to ambulations, medications, etc⁴.

Because of the demanding nature of the caregiver role for a delirious critical care patient, families are 12 times more likely to have generalized anxiety. A quantitative study of 212 family caregivers showed reported psychological distress in 41-62%⁷. Another study which included 99 patients who had experienced delirium in the hospital setting, showed that 73 remembered the incident and 59 reported that the delirium was distressing⁷. The distress score, however, was higher in family caregivers of these patients⁷.

Nursing Implications

Steis and Gordon (2012) found in a systematic review that although nurses use several types of assessments to determine delirium, there is a 26% to 83% variance in reporting delirium, which indicates that nurses may be able to define delirium, but not recognize it in their patients. The investigators concluded that in the studies reviewed, nurses are missing key symptoms of delirium and seem to be doing superficial mental status assessments. A study of 111 patients found that although nurses documented signs of delirium, they were unable to recognize that these signs were related to acute delirium. Consequently, when nursing interventions were applied, they may have exacerbated the condition (for example, the application of immobilizing devices)¹⁹.

Assessing the patient for acute disorders that can cause significant pain is good first step. For example, verifying the position of the endotracheal tube in intubated patients, as well as assessing the temperature curve for new onset fever, is essential to consider in an agitated patient with delirium¹³. Checking for non-immediately life-threatening conditions, such as adjusting ventilator settings, applying ice chips or moisturizing cream to dry lips to reduce discomfort, and

adjusting the position of the patient in bed are interventions that can decrease agitation in the delirious patient¹³.

In patients with preexisting cognitive impairment such as dementia, it is imperative to establish and document their baseline mental status. This can be accomplished by interviewing caregivers to determine their baseline level of day-to-day functioning and mental status before the current illness. This will allow nursing staff to interpret any mental status changes in the patient³. Individuals with mild to moderate dementia are capable of being attentive and engaged during communication. It is also not "normal" to fluctuate between levels of consciousness. Delirium screening tools are just as effective in individuals with dementia as they are in those without dementia¹¹.

Conclusion

Delirium is a common, yet potentially preventable condition in the critical care setting. Critical care nurses play a crucial role in preventing complications associated with delirium. Educational programs should be aimed at building knowledge among staff members and instilling confidence to detect early signs and symptoms of delirium. Because of the complex nature of this condition, the nurse also plays an important role as a family advocate. Early detection, proper treatment, and a mind for potential psychosocial complications among the patient and family are nursing interventions imperative for improved patient outcomes in the delirious critical care patient.

CAM-ICU Worksheet

Feature 1: Acute Onset or Fluctuating Course	Score	Check here if Present						
<p>Is the pt different than his/her baseline mental status? OR</p> <p>Has the patient had any fluctuation in mental status in the past 24 hours as evidenced by fluctuation on a sedation scale (i.e., RASS), GCS, or previous delirium assessment?</p>	Either question Yes →	<input type="checkbox"/>						
Feature 2: Inattention								
<p><u>Letters Attention Test</u> (See training manual for alternate Pictures)</p> <p><u>Directions:</u> Say to the patient, "I am going to read you a series of 10 letters. Whenever you hear the letter 'A,' indicate by squeezing my hand." Read letters from the following letter list in a normal tone 3 seconds apart.</p> <p style="text-align: center;">S A V E A H A A R T</p> <p>Errors are counted when patient fails to squeeze on the letter "A" and when the patient squeezes on any letter other than "A."</p>	Number of Errors >2 →	<input type="checkbox"/>						
Feature 3: Altered Level of Consciousness								
Present if the Actual RASS score is anything other than alert and calm (zero)	RASS anything other than zero →	<input type="checkbox"/>						
Feature 4: Disorganized Thinking								
<p><u>Yes/No Questions</u> (See training manual for alternate set of questions)</p> <ol style="list-style-type: none"> 1. Will a stone float on water? 2. Are there fish in the sea? 3. Does one pound weigh more than two pounds? 4. Can you use a hammer to pound a nail? <p>Errors are counted when the patient incorrectly answers a question.</p> <p><u>Command</u> Say to patient: "Hold up this many fingers" (Hold 2 fingers in front of patient) "Now do the same thing with the other hand" (Do not repeat number of fingers) *If pt is unable to move both arms, for 2nd part of command ask patient to "Add one more finger"</p> <p>An error is counted if patient is unable to complete the entire command.</p>	Combined number of errors >1 →	<input type="checkbox"/>						
<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2" style="text-align: center;">Overall CAM-ICU</th> </tr> </thead> <tbody> <tr> <td style="width: 50%;">Criteria Met →</td> <td style="width: 50%; text-align: center;"><input type="checkbox"/> CAM-ICU Positive (Delirium Present)</td> </tr> <tr> <td>Criteria Not Met →</td> <td style="text-align: center;"><input type="checkbox"/> CAM-ICU Negative (No Delirium)</td> </tr> </tbody> </table>			Overall CAM-ICU		Criteria Met →	<input type="checkbox"/> CAM-ICU Positive (Delirium Present)	Criteria Not Met →	<input type="checkbox"/> CAM-ICU Negative (No Delirium)
Overall CAM-ICU								
Criteria Met →	<input type="checkbox"/> CAM-ICU Positive (Delirium Present)							
Criteria Not Met →	<input type="checkbox"/> CAM-ICU Negative (No Delirium)							
Feature 1 <u>plus</u> 2 <u>and</u> either 3 <u>or</u> 4 present = CAM-ICU positive								

Figure 1 Vanderbilt University Medical Center. (n.d.). *Assessment resources for ICU delirium*. Retrieved from http://www.mc.vanderbilt.edu/icudelirium/docs/CAM_ICU_worksheet.pdf

PATIENT EVALUATION	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Altered level of consciousness* (A-E)					
If A or B do not complete patient evaluation for the period					
Inattention					
Disorientation					
Hallucination - delusion - psychosis					
Psychomotor agitation or retardation					
Inappropriate speech or mood					
Sleep/wake cycle disturbance					
Symptom fluctuation					
TOTAL SCORE (0-8)					

Level of consciousness*	Score
A: no response	none
B: response to intense and repeated stimulation (loud voice and pain)	none
C: response to mild or moderate stimulation	1
D: normal wakefulness	0
E: exaggerated response to normal stimulation	1

SCORING SYSTEM :

The scale is completed based on information collected from each entire 8-hour shift or from the previous 24 hours. Obvious manifestation of an item = 1 point. No manifestation of an item or no assessment possible = 0 point. The score of each item is entered in the corresponding empty box and is 0 or 1.

1. Altered level of consciousness:

- A) No response or B) the need for vigorous stimulation in order to obtain any response signified a severe alteration in the level of consciousness precluding evaluation. If there is coma (A) or stupor (B) most of the time period then a dash (-) is entered and there is no further evaluation during that period.
- C) Drowsiness or requirement of a mild to moderate stimulation for a response implies an altered level of consciousness and scores 1 point.
- D) Wakefulness or sleeping state that could easily be aroused is considered normal and scores no point.
- E) Hypervigilance is rated as an abnormal level of consciousness and scores 1 point.

2. Inattention: Difficulty in following a conversation or instructions. Easily distracted by external stimuli. Difficulty in shifting focuses. Any of these scores 1 point.

3. Disorientation: Any obvious mistake in time, place or person scores 1 point.

4. Hallucination, delusion or psychosis: The unequivocal clinical manifestation of hallucination or of behaviour probably due to hallucination (e.g. trying to catch a non-existent object) or delusion. Gross impairment in reality testing. Any of these scores 1 point.

5. Psychomotor agitation or retardation: Hyperactivity requiring the use of additional sedative drugs or restraints in order to control potential dangerousness (e.g. pulling out iv lines, hitting staff). Hypoactivity or clinically noticeable psychomotor slowing. Any of these scores 1 point.

6. Inappropriate speech or mood: Inappropriate, disorganised or incoherent speech. Inappropriate display of emotion related to events or situation. Any of these scores 1 point.

7. Sleep/wake cycle disturbance: Sleeping less than 4 hours or waking frequently at night (do not consider wakefulness initiated by medical staff or loud environment). Sleeping during most of the day. Any of these scores 1 point.

8. Symptom fluctuation: Fluctuation of the manifestation of any item or symptom over 24 hours (e.g. from one shift to another) scores 1 point.

Figure 2 Vanderbilt University Medical Center. (n.d.). *Assessment resources for ICU delirium*. Retrieved from <http://www.mc.vanderbilt.edu/icudelirium/docs/ICDSC.pdf>

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